Primary Diagnosis

This section provides an overview of the kidneys and their functions and reports information on the primary diagnoses and patient characteristics of the KHC incident population. The kidneys perform many functions that affect all parts of the body. Healthy kidneys clean the blood by filtering out excess water and waste products. They also produce hormones that regulate blood pressure and keep bones strong. The kidneys also perform the regulation of the body's salt and potassium.

There are many types of conditions and diseases that affect the function of the kidneys, ranging from urinary tract infections to diabetic nephropathy, the latter leading to more serious complications, even complete kidney failure. Congenital malformations, and injuries can also render the kidneys incapable of performing their life-sustaining functions.

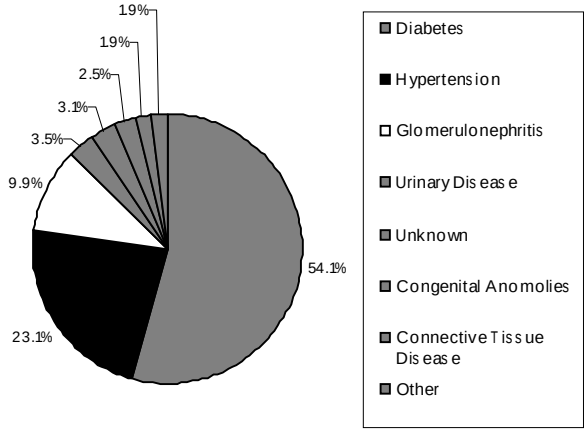
Kidney failure is divided into two categories. ***Acute kidney failure*** often has a sudden onset, and in most cases, kidney function can be restored. ***Chronic or permanent kidney failure,*** usually develops over a period of years and is the more common diagnosis among the two categories of kidney failure. This complete and irreversible loss of kidney function is known as End-Stage Renal Disease (ESRD), and requires dialysis or transplantation to perform the function of the failed kidneys. Of all the known causes of kidney failure, diabetes, hypertension, and glomerulonephritis are the most common.

Diabetes is a disease in which the pancreas does not produce enough insulin or cannot efficiently use the insulin that is produced. Insulin is a hormone that regulates the amount of glucose (sugar) in the blood. Without insulin, the body is unable to convert glucose to energy, leaving large amounts of sugar in the blood stream. Eventually, small blood vessels in the kidneys become damaged. Scar-like material builds up on the capillary walls of the glomeruli where filtering takes place, which impairs kidney function. This leads to **Diabetic Nephropathy**. In addition, diabetes can lead to other co-morbid conditions such as diabetic neuropathy and cardiovascular disease.

In Fiscal Year 1999, diabetes was, again, the leading cause of ESRD for approved KHC applicants, comprising 54.1% of that group. This is consistent with the USRDS 1999 Annual Report in which they report that "diabetes was the most common attributed cause of ESRD".

Hypertension followed at 23.1%, a slight decrease from applicants in FY98 with a primary diagnosis of hypertension (24.1%). The proportion of applicants with glomerulonephritis increased from 9% in FY98 to 9.9% in FY99.

Figure 7: Primary Diagnosis of FY99 Applicants



In FY99, **Hypertension** was the second leading cause of ESRD among KHC program applicants. The constriction of blood vessels caused by hypertension cuts off the blood supply to the kidneys, starving them of the oxygen and nutrients nesessary for survival. As a result, the working units of the kidneys (nephrons) become damaged after years of stress from the hypertension, leaving the kidneys incapable of performing their essential functions.

Glomerulonephritis refers to a group of diseases caused by inflammation and destruction of the glomeruli, the blood filtering structures in the nephrons. Physicians divide glomerulonephritis into two subtypes. ***Acute glomerulonephritis***, distinguished by a rapid loss of kidney function, is caused by an immune response to a bacterial infection. Nephrologists can successfully treat this form of glomerulonephritis with antibiotics.

Chronic glomerulonephritis, the cause of which is widely debated, is often asymptomatic and can progressively destroy the nephrons over a period of years. Currently, there is no cure for this chronic form of glomerulonephritis.

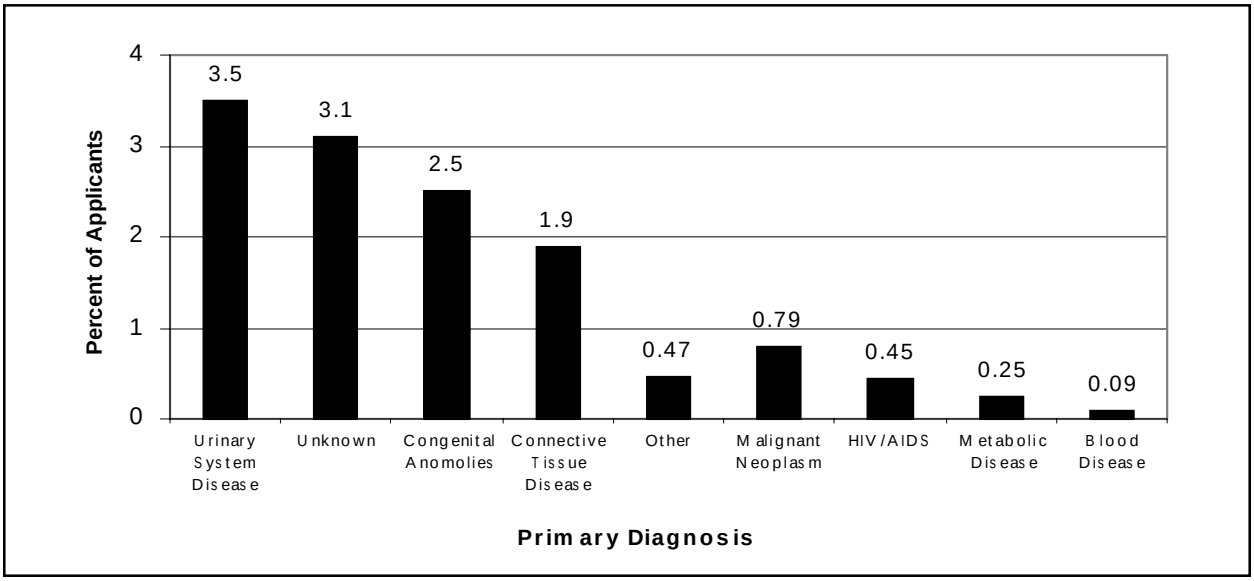
Following Diabetes, Hypertension and Glomerulonephritis, the most common primary diagnoses in FY99 were Urinary System Disease (3.5%) and Unknown Etiology (3.1%). Urinary System Disease includes interstitial nephritis (a disease that affects the bladder), urinary tract infections, kidney stones, and other disorders of the urinary system. Both of these primary diagnoses comprised 6.6% of all KHC approved applicants in FY99.

Other causes of kidney failure account for less than 7% of ESRD among KHC applicants. These include Congenital Anomalies, Connective Tissue Disease, Malignant Neoplasm (Cancer), HIV/ AIDS, Metabolic Diseases, Blood Diseases, and Other.

Primary Diagnosis and Age

When looking at primary diagnoses by age distribution, it can be seen that diabetes is the leading cause of ESRD in KHC applicants who were over the age of 35 at the time of entry onto the program

Figure 8: Other Primary Diagnoses



in FY99. Ten years ago, diabetes was the leading cause of ESRD in applicants who were over the age of 21 at the time of entry onto the program, with the exception of applicants in the 75 and older age group. In FY89, hypertension was the most common cause of ESRD among applicants age 75 and older (49.1%) and in FY99, diabetes surpassed hypertension as the primary diagnosis for this group of applicants. This increase may reflect the aging of the population in general, an increased incidence of diabetes, as well as improved survival rates among diabetic patients. The success in treating hypertension with antihypertensive agents may have played a role in the prevention and or delay of ESRD for many patients.

In the age group 21-34, glomerulonephritis is the leading cause of ESRD, followed by diabetic nephropathy. The proportion of applicants whose kidneys failed due to hypertension increased from 17.9% in FY89 to 23% in FY99.

Among the youngest applicants, those under the age of 21 at the time of entry onto the program, congenital anomalies (19.6%) and glomerulonephritis (37%) were the most common causes of ESRD. In FY89, those with a primary diagnosis of congenital anomolies comprised 9.9% of that age group and those with a primary diagnosis of glomerulonephritis comprised 45.1% of that age group.

A detailed listing of primary diagnoses by age can be found in Tables 11 and 12 for both FY89 and FY99 KHC applicants.

Figure 9: Primary Diagnosis by Age, FY89

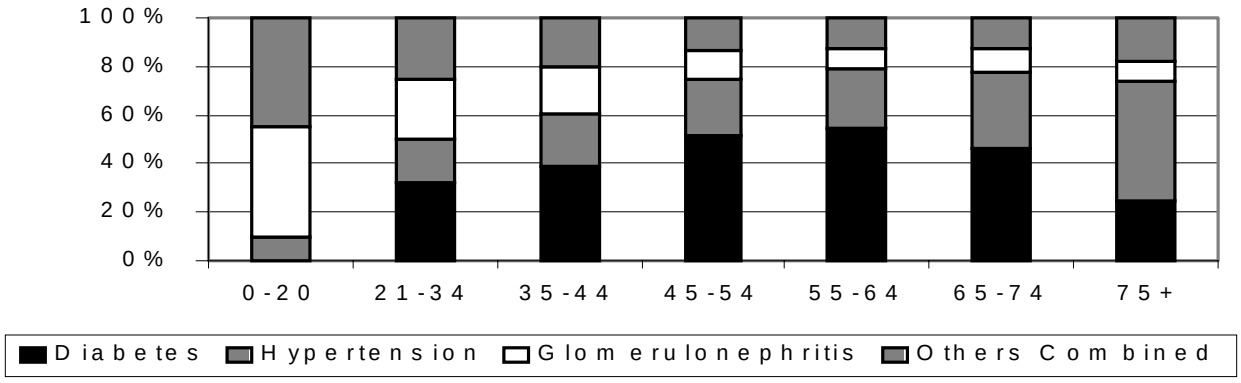


Figure 10: Primary Diagnosis by Age, FY99

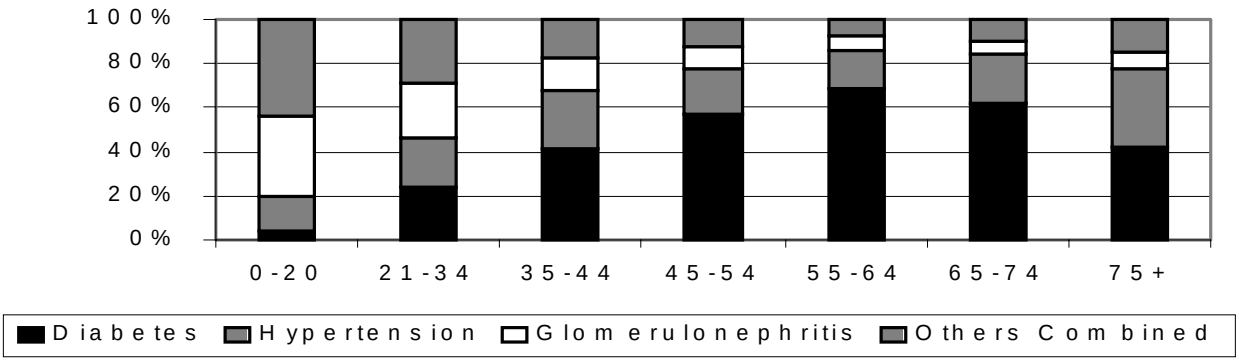


Table 11: Primary Diagnosis by Age, FY89

Primary Diagnosis	0-20		21-34		35-44		45-54		55-64		65-74		75+		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Diabetic Nephropathy	0	0	107	31.8	142	38.9	224	51.6	358	54.4	262	46.1	79	24.7	1172	42.6
Primary Hypertension	7	9.9	60	17.9	79	21.6	99	22.8	164	24.9	178	31.3	157	49.1	744	27.0
Glomerulo-nephritis	32	45.1	83	24.7	72	19.7	53	12.2	54	8.2	58	10.2	27	8.4	379	13.8
Unknown Etiology	7	9.9	23	6.8	17	4.7	8	1.8	18	2.7	24	4.2	13	4.1	110	4.0
Congenital Anomalies	7	9.9	11	3.3	26	7.1	29	6.7	20	3.0	9	1.6	4	1.3	106	3.9
Urinary System Disease	14	19.7	11	3.3	1	0.3	5	1.2	15	2.3	11	1.9	13	4.1	70	2.5
Connective Tissue Disease	2	2.8	25	7.4	14	3.8	8	1.8	6	0.9	0	0.0	3	0.9	58	2.1
Malignant Neoplasm	0	0	1	0.3	1	0.3	2	0.5	6	0.9	7	1.2	5	1.6	22	0.8
HIV/AIDS	0	0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Metabolic Disease	0	0	0	0.0	4	1.1	1	0.2	4	0.6	3	0.5	2	0.6	14	0.5
Blood Diseases	0	0	3	0.9	2	0.5	0	0.0	0	0.0	0	0.0	0	0.0	5	0.2
Other	2	2.8	12	3.6	7	1.9	5	1.2	13	2.0	16	2.8	17	5.3	72	2.6
Total % by Age Group	**71**	**2.6**	**336**	**12.2**	**365**	**13.3**	**434**	**15.8**	**658**	**23.9**	**568**	**20.6**	**320**	**11.6**	**2752**	**100**

Table 12: Primary Diagnosis by Age, FY99

Primary Diagnosis	0-20		21-34		35-44		45-54		55-64		65-74		75+		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Diabetic Nephropathy	2	4.3	72	23.6	212	41.5	480	57.4	710	68.6	655	61.6	272	42.3	2403	54.1
Primary Hypertension	7	15.2	70	23.0	135	26.4	170	20.3	178	17.2	238	22.4	226	35.1	1024	23.1
Glomerulo-nephritis	17	37.0	75	24.6	76	14.9	80	9.6	73	7.1	68	6.4	49	7.6	438	9.9
Unknown Etiology	3	6.5	24	7.9	12	2.3	28	3.3	13	1.3	20	1.9	37	5.8	137	3.1
Congenital Anomalies	9	19.6	9	3.0	20	3.9	32	3.8	14	1.4	16	1.5	10	1.6	110	2.5
Urinary System Disease	6	13.0	11	3.6	15	2.9	22	2.6	23	2.2	44	4.1	34	5.3	155	3.5
Connective Tissue Disease	1	2.2	33	10.8	24	4.7	17	2.0	6	0.6	1	0.1	0	0.0	82	1.8
Malignant Neoplasm	0	0.0	0	0.0	2	0.4	2	0.2	11	1.1	12	1.1	8	1.2	35	0.8
HIV/AIDS	0	0.0	3	1.0	10	2.0	5	0.6	0	0.0	1	0.1	1	0.2	20	0.4
Metabolic Disease	0	0.0	1	0.3	3	0.6	0	0.0	3	0.3	2	0.2	2	0.3	11	0.2
Blood Diseases	1	2.2	2	0.7	1	0.2	0	0.0	0	0.0	0	0.0	0	0.0	4	0.1
Other	0	0.0	5	1.6	1	0.2	0	0.0	4	0.4	7	0.7	4	0.6	21	0.5
Total % by Age Group	**46**	**1.0**	**305**	**6.9**	**511**	**11.5**	**836**	**18.8**	**1035**	**23.3**	**1064**	**24.0**	**643**	**14.5**	**4440**	**100**

Primary Diagnosis and Ethnic Group

The ethnic distribution of ESRD among FY89 and FY99 KHC applicants is shown in Figures 11 and 12 below, which reveal an increase in diabetes among all ethnic groups. Notable is the sizable proportion of FY99 applicants in the Hispanic group whose kidneys failed due to diabetes (71.3%). This proportion has increased from FY89, when 60.5% of Hispanics approved for KHC benefits had this primary diagnosis.

Figure 11: Primary Diagnosis and Ethnic Group, FY89

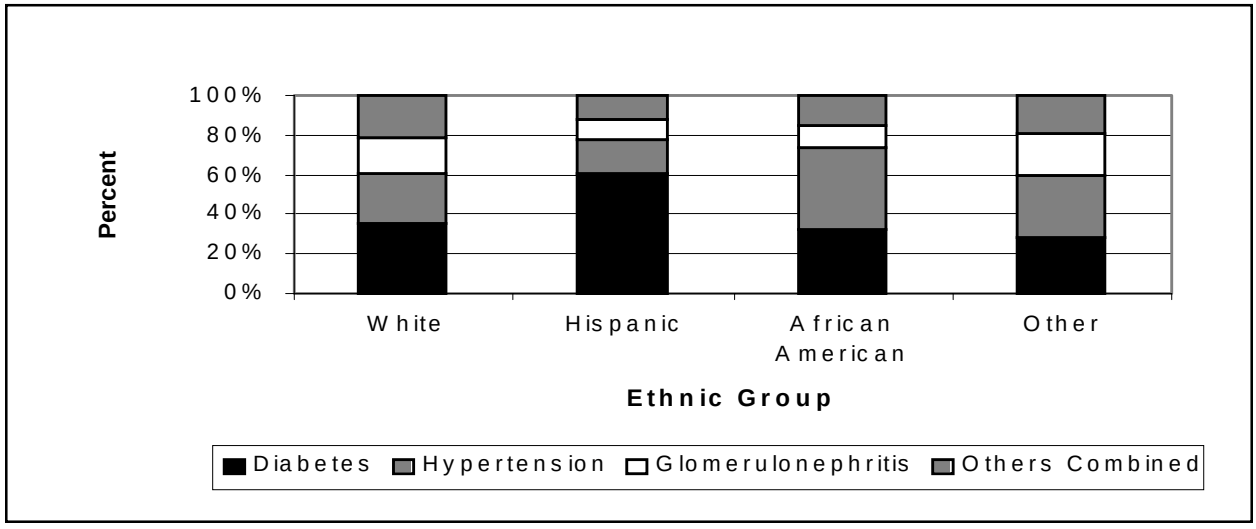


Figure 12: Primary Diagnosis and Ethnic Group, FY99

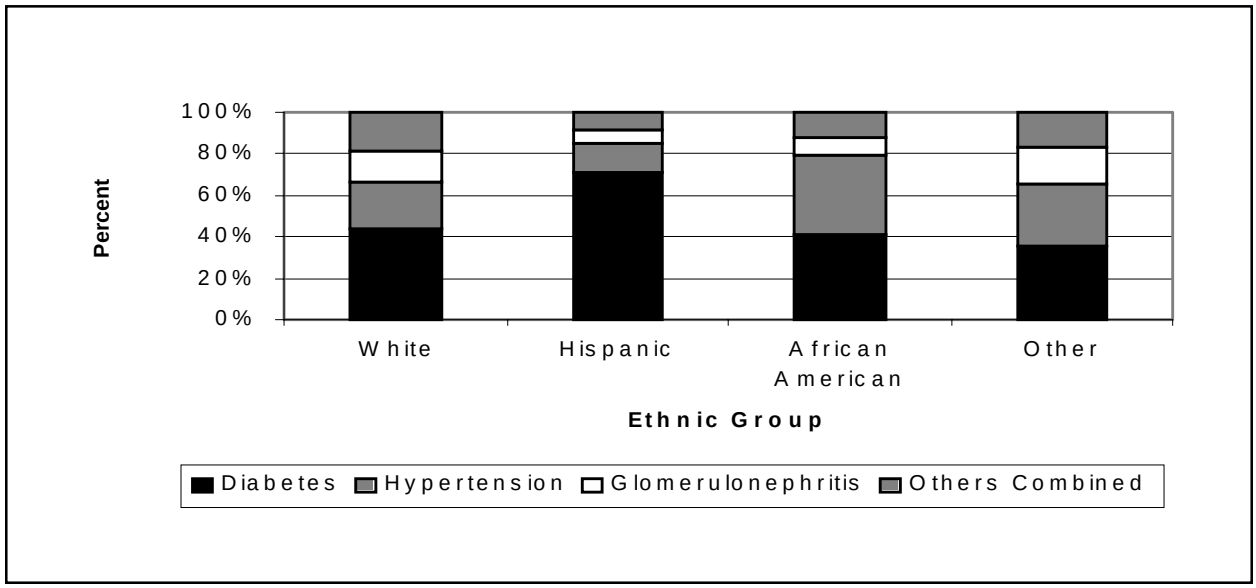


Table 13: Primary Diagnosis by Ethnic Group, FY89

Primary Diagnosis	African American		Hispanic		White		Other		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%
Diabetic Nephropathy	240	32.1	534	60.5	386	35.8	12	28.6	1,172	42.6
Primary Hypertension	314	42.0	150	17.0	267	24.7	13	31.0	744	27.0
Glomerulonephritis	79	10.6	90	10.2	201	18.6	9	21.4	379	13.8
Unknown Etiology	36	4.8	31	3.5	42	3.9	1	2.4	110	4.0
Congenital Anomalies	16	2.1	26	2.9	62	5.7	2	4.8	106	3.9
Urinary System Disease	15	2.0	12	1.4	43	4.0	0	0.0	70	2.5
Connective Tissue Disease	22	2.9	18	2.0	15	1.4	3	7.1	58	2.1
Malignant Neoplasm	8	1.1	3	0.3	11	1.0	0	0.0	22	0.8
HIV/AIDS	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Metabolic Disease	1	0.1	3	0.3	10	0.9	0	0.0	14	0.5
Blood Diseases	5	0.7	0	0.0	0	0.0	0	0.0	5	0.2
Other	12	1.6	16	1.8	42	3.9	2	4.8	72	2.6
Total all Ethnic Groups	748	27.2	883	32.1	1,079	39.2	42	1.5	2,752	100

Table 14: Primary Diagnosis by Ethnic Group, FY99

Primary Diagnosis	African American		Hispanic		White		Other		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%
Diabetic Nephropathy	494	41.3	1,279	71.3	606	43.8	24	35.8	2,403	54.1
Primary Hypertension	454	37.9	240	13.4	310	22.4	20	29.9	1,024	23.1
Glomerulonephritis	105	8.8	119	6.6	202	14.6	12	17.9	438	9.9
Unknown Etiology	37	3.1	39	2.2	57	4.1	4	6.0	137	3.1
Congenital Anomalies	14	1.2	36	2.0	56	4.1	4	6.0	110	2.5
Urinary System Disease	24	2.0	33	1.8	96	6.9	2	3.0	155	3.5
Connective Tissue Disease	38	3.2	30	1.7	14	1.0	0	0.0	82	1.8
Malignant Neoplasm	6	0.5	11	0.6	17	1.2	1	1.5	35	0.8
HIV/AIDS	18	1.5	1	0.1	1	0.1	0	0.0	20	0.5
Metabolic Disease	1	0.1	4	0.2	6	0.4	0	0.0	11	0.2
Blood Diseases	3	0.3	0	0.0	1	0.1	0	0.0	4	0.1
Other	3	0.3	2	0.1	16	1.2	0	0.0	21	0.5
Total all Ethnic Groups	1,197	27.0	1,794	40.4	1,382	31.1	67	1.5	4,440	100

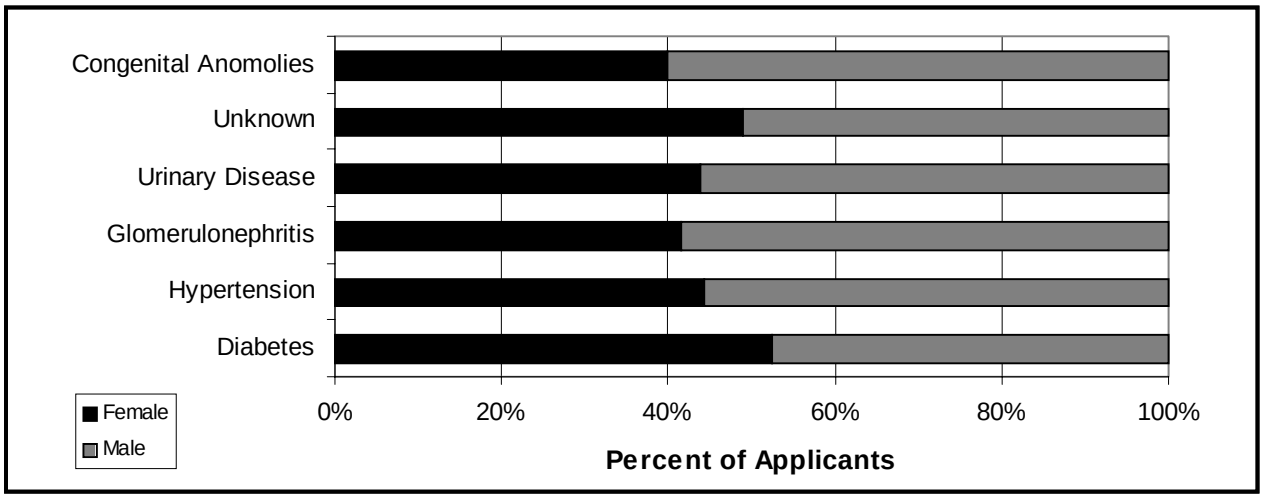
Primary Diagnosis and Gender

Table 15 shows that the distribution of ESRD by gender is almost equally divided between male and female applicants. The percent of female applicants with a primary diagnosis of diabetes (28.4%) is slightly higher than that of males (25.8%); however, male applicants with a primary diagnosis of hypertension (12.8%) continue to out number their female counterparts (10.2%).

Table 15: Primary Diagnosis and Gender

Primary Diagnosis	Female	%	Male	%	Total	% Total
Diabetic Nephropathy	1,259	28.4	1,144	25.8	2,403	54.1
Primary Hypertension	455	10.2	569	12.8	1,024	23.1
Glomerulonephritis	182	4.1	256	5.8	438	9.9
Etiology Unknown	67	1.5	70	1.6	137	3.1
Congenital Anomolies	44	1.0	66	1.5	110	2.5
Urinary System Disease	68	1.5	87	2.0	155	3.5
Connective Tissue Disease	69	1.6	13	0.3	82	1.8
Malignant Neoplasm	14	0.3	21	0.5	35	0.8
HIV-AIDS	5	0.1	15	0.3	20	0.4
Metabolic Disease	4	0.1	7	0.2	11	0.2
Blood Disease	1	0.0	3	0.1	4	0.1
Other	10	0.2	11	0.2	21	0.5
% Total	**2,178**	**49.1**	**2,262**	**50.9**	**4,440**	**100**

Figure 13: Primary Diagnosis by Gender



Primary Diagnosis Trends

Figure 14 illustrates the increased growth in the percent of KHC approved applicants with the diagnosis of diabetic nephropathy and shows that in FY89, diabetes accounted for 42% of the KHC incident population. In FY96, this primary diagnosis surpassed 50% and increased to 54.1% in FY99.

Figure 15 illustrates a similar trend in the growth of the diabetic ESRD population on a national level. Similar trends are apparent, with diabetes as a primary diagnosis increasing from approximately 33% in 1989 to 42% in 1997.

It should be noted that the percent of KHC applicants with a primary diagnosis of diabetic nephropathy is consistently higher than the national average for all years being reported, which may be due to the large population of Hispanics in the state.

Figure 14: KHC Trends in Primary Diagnoses, FY89-FY99

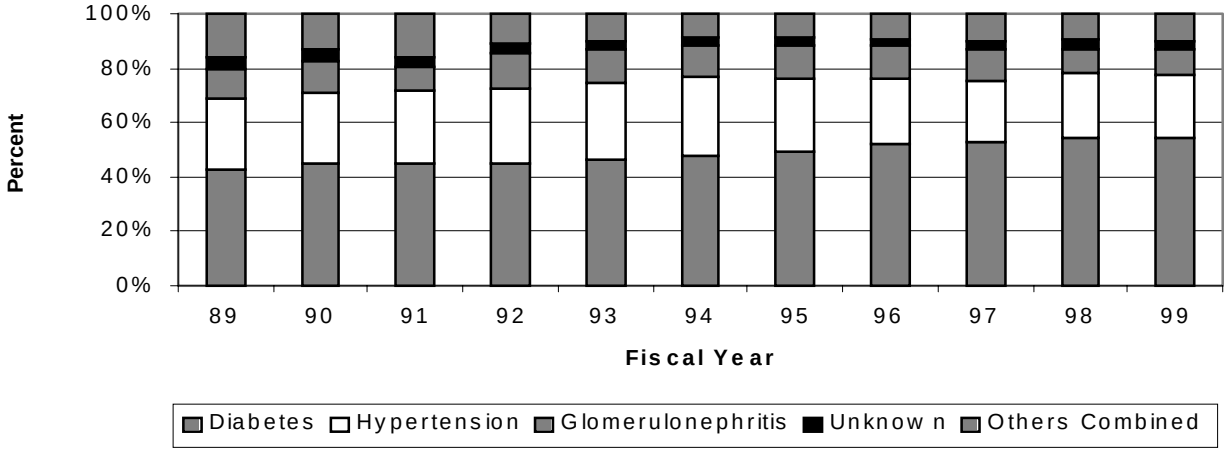


Figure 15: National Trends in Primary Diagnoses, 1989-1997
Source: United States Renal Data System 1999 Annual Data Report